SECTION 9
KNOWN PERCHLORATE SITES AND CLEANUP OPERATIONS

I. INTRODUCTION

In California, most of the locations where perchlorate has been detected are associated with facilities that have manufactured or tested solid rocket fuel for the Department of Defense or the National Aeronautics and Space Administration. One-third of all perchlorate used in the United States is used in California and 90% of California's use is related to the aerospace industry.

Perchlorate salts are also used in pyrotechnics, fireworks, highway safety flares, automotive air bag initiators, explosives and military munitions. In some instances, perchlorate was unexpectedly detected in areas where no obvious perchlorate handling activities took place. In most others, perchlorate was found in the environment near facilities that were documented users or manufacturers of perchlorate salts including the Colorado River.

What geographical areas are known to be contaminated with perchlorate? Several sites have been identified as potential sources of contamination. Most areas where perchlorate has been detected are associated with known uses of perchlorate. In California, documented areas of contamination include:

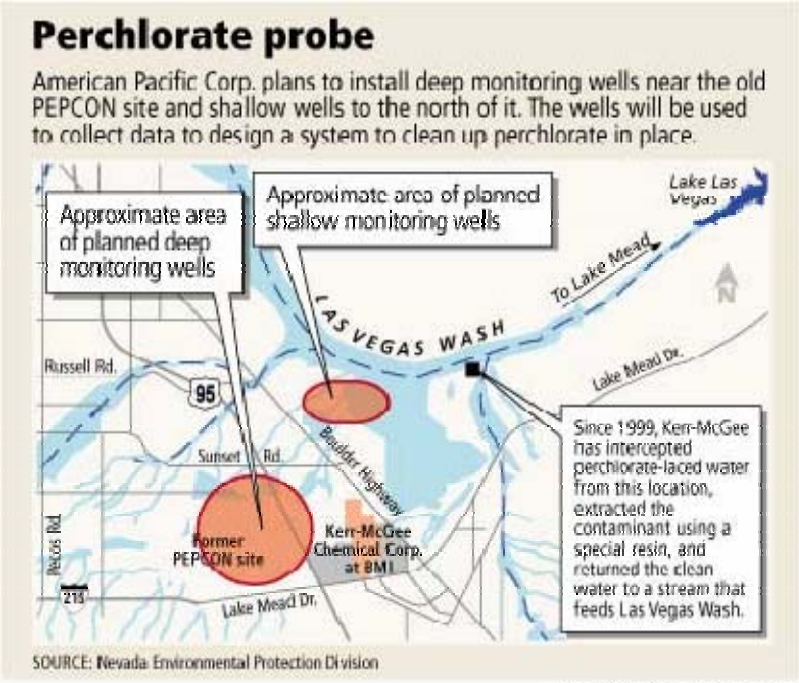
California Areas of Perchlorate Contamination

County	City	Sources
Sacramento	Rancho Cordova	Aerojet General Corporation
Placer	Lincoln	explosive manufacturing
Santa Clara	San Jose	United Technologies
	Morgan Hill	Olin Corp
San Benito	Hollister	Whittaker Ordinance Facility near Hollister
San Joaquin	Tracy	Lawrence Livermore National Laboratory
	Stockton	Unknown
Ventura		Boeing's Santa Susana Field Laboratory
Los Angeles	Azusa	Aerojet Corporation
	Santa Clarita	Whittaker–Bermite
	Pasadena	Jet Propulsion Laboratory
San Bernardino	Crafton/Redlands	Lockheed Propulsion Company
	Colton/Rialto	Fireworks manufacturing
Riverside	Corona	Unknown
	Coachella	
	City of Riverside	
San Diego	Escondido	Contaminated by Colorado River

II. PERCHLORATE CONTAMINATION IN OTHER STATES

Nevada

Kerr McGee Chemical Company - Henderson, NV



Perchlorate contaminated ground water from Henderson, Nevada threatens the drinking water supply of 15 to 20 million people whose drinking water supplies originate from the lower Colorado River system. The contamination originates from the Kerr McGee Chemical Company (KMCC) in Henderson, Nevada where prior owners/operators made perchlorate (a solid rocket fuel ingredient) beginning in the early 1950s and continued perchlorate production until 1998. The Kerr-McGee plume moves to the north from the Kerr McGee site down to the Las Vegas Wash. The plume initiates in the Kerr-McGee industrial area and was formed by onsite perchlorate discharges. This plume had concentrations ranging from 18000 ppm in the industrial area to about 50 ppm close to the Las Vegas Wash prior to remediation. The volume and perchlorate mass estimated for the Kerr-McGee plume are 8,679 million gallons and 20.4 million pounds, respectively. (111).

Since 1997, USEPA and the Nevada Division of Environmental Protection have been working with Kerr-McGee to ensure that perchlorate releases to Las Vegas Wash and Lake Mead are reduced as effectively and as quickly as possible. The control strategy adopted by Kerr McGee has three goals: 1) capture and treat the most concentrated perchlorate at its source on Kerr McGee property; 2) intercept and treat the contamination near the Las Vegas Wash to reduce impacts on the Wash and on Lake Mead as quickly as possible; and 3) extract and treat perchlorate from wells installed at a site midway between the Kerr McGee plant and the Wash where a narrow subsurface channel allows effective and efficient capture of ground water. The captured ground water and surface water is treated in

fluidized bed reactors (biologically based waste water treatment systems) to remove more than 99.99% of the perchlorate.

Initial control efforts began in 1999 at two of the three capture locations. The three location control strategy was fully implemented beginning in October 2002 when the midpoint capture wells became fully operational. The complete system captures 1700 to 2000 pounds per day of perchlorate before it reaches Las Vegas Wash. As of February 2005 the Kerr McGee control systems have captured more than 3.0 million pounds (1500 tons) of perchlorate. To date the controls have reduced perchlorate releases to Las Vegas Wash from about 900 pounds per day before controls to about 110 to 150 pounds per day, a reduction of about 85%. Further decreases to less than 100 pounds per day are expected in 2005.

As a result of these control efforts, perchlorate concentrations in Lake Mead and the lower Colorado River have begun to decline and are expected to decline further in 2005 and 2006. Annual average concentrations at the Las Vegas drinking water intake in Lake Mead declined almost 60% between 2000 and 2004 (from 13.1 ppb to 5.6 ppb); the 2005 annual average is expected to decline to less than 5 ppb. Annual average concentrations in the Metropolitan Water District (MWD) Colorado River Aqueduct intake at Lake Havasu on the Lower Colorado River also declined about 50% between 2000 and 2004 (from 6.4 ppb to less than 4 ppb); in 2004 nine of the twelve monthly samples were non-detect (method detection limit is 4 ppb).

Pacific Engineering and Production Company, Henderson

A second perchlorate manufacturing plan owned by Pacific Engineering and Production Company of Nevada (PEPCON) began operating in Henderson in 1958. An explosion in 1988 leveled the facility and it never reopened. The PEPCON site also has a plume of perchlorate contamination. The PEPCON plume originates at the PEPCON area and is directed to the North portion of the site having. The perchlorate concentrations found in the PEPCON plume are much lower than those found in the Kerr-McGee plume, having concentrations ranging from 600 ppm in the vicinity of PEPCON site to less than 1 ppm near the Las Vegas Wash (111). The likely source was surface impoundments used for chemical waste disposal in the years predating pollution control laws. Perchlorate from the PEPCON site is likely not impacting the Las Vegas Wash or waters downstream. (Madsen 2005)

Upper and Lower Ponds

The Upper and Lower Ponds were constructed in the early 1940's. The Upper Ponds and Lower Ponds are located inside an area limited by the Boulder Highway (south – northwest), Lake Mead Drive (south – northeast) and the Las Vegas Wash (north). The Upper and Lower Ponds are formed by a series of interconnected disposal cells following the local topography. The total area of the ponds was approximately 1345 acres, from which 430 acres constituted the Lower Ponds and 915 acres formed the Upper Ponds (Geraghty & Miller 1993). The Upper and Lower Ponds were unlined and the disposal was performed via evaporation and infiltration.

Perchlorate process wastewaters were placed in these ponds from 1945 to 1976. In general, the perchlorate wastes were discharged into the Upper Ponds. The existing documentation does not identify specifically which portions of the Upper Ponds had received the perchlorate waste. Kerr-McGee used the ponds to dispose off perchlorate

process wastewater until onsite-lined ponds replaced them. The total amount of perchlorate-containing wastes discharged into the ponds is estimated to be 293,756 tons (Jacobs 1987). The exact quantity of pure perchlorate within these wastes is not known.

A third perchlorate plume in the Henderson area starts in the Upper Ponds area spreading toward the north and northeast, reaching the Las Vegas Wash, and intercepting the Kerr-McGee plume. The concentrations in this plume are much smaller than the concentration in the other two plumes and range from about 20 ppm in the northeast to less than 1 ppm in the north. The estimated volume is 9,032 million gallons and the estimated perchlorate mass was 1.1 million pounds.

Massachusetts

Out of approximately 600 water supply wells tested, only six had detectable levels of perchlorate. Investigations have determined sources other than solid rocket propellants and artillery sources. In 2002, the Town of Bourne identified perchlorate in its drinking water source. The source was determined to be an area where Fourth of July fireworks are staged annually. Testing of soil, groundwater, and firework fragments showed measurable perchlorate concentrations following displays.

In 2004, Tewksbury's water supply and two surface rivers were affected by perchlorate. Sampling at the water treatment plant detected both the influent and effluent was also impacted. A manufacturer of medical-grade felt that uses perchloric acid in its process was identified as the origin of more than 2,000 ppb. The industrial discharger implemented an ion exchange treatment system eliminating the perchlorate discharge.

Blasting activities associated with roadway construction was found to be the source of a contaminated drinking well that was taken off-line. Blasting activities that used water gels or

emulsion formulas where high energy is needed under watery conditions was the contributing source.

Massachusetts Military Reservation (MMR) Cape Cod
MMR is a 22,000-acre base comprised of the Impact and Training Areas and the Otis Air Force Base. Cleanup of the base continues under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). For the Impact and Training Areas, routine training (e.g., firing of artillery, mortars, and open detonation of explosives) is the primary source of contamination. As a result, several billion gallons of groundwater contaminated with explosives, perchlorate, and other chemicals are emanating from numerous source areas. A 1997 Safe Drinking Water Act (SDWA) order halted live training activities pending completion of investigations for the training area and implementation of remedial actions.

Perchlorate has been detected both on and off MMR property. Low levels (below one part per billion (ppb)) of perchlorate have been detected in public supply wells to the west of MMR. These wells provided 70% of the town of Bourne's drinking water. In addition, several residential wells and a community supply well northwest of the base have been identified as containing perchlorate. The maximum detection in the wells northwest of MMR is 1.8 ppb in one of the residential wells. One-hundred-forty (140) ppb of perchlorate was recently detected in a newly installed monitoring well in the southeast range area of the base. This detection is within the zone of contribution of a drinking water supply well recently installed on MMR to provide replacement water to the surrounding communities that have had wells or well fields closed due to contamination emanating from MMR.

Alabama

Redstone Army Arsenal - Huntsville
Established in 1941, Redstone Army Arsenal is an active U.S. Army facility occupying about 38,300 acres in Madison County, Alabama. Between 1942 and 1945, the Army produced conventional and chemical munitions for World War II, including perchlorate-based colored smoke munitions. Subsequently, the Thiokol Chemical Corporation and the Rohm and Haas Company began operations at Redstone in 1949 in support of the Army, Navy, Air Force, and NASA aerospace programs. The Raytheon Company began solid propellant research and development operations in the former Rohm and Haas area in 1974. The manufacture of solid propellants ceased when Thiokol stopped its operations at Redstone in 1996.

The maximum concentration of perchlorate detected to date in shallow groundwater is 19,000 parts per billion (ppb). A chlorinated solvent and perchlorate plume has migrated beyond the east boundary of the facility; however, residents in the adjacent subdivisions utilize a public water supply and are not at risk from the contamination. In 2000, EPA, the Alabama Department of Environmental Management (ADEM), and Redstone agreed to shut down a groundwater treatment system for chlorinated solvents that was inadvertently discharging untreated perchlorate to the Tennessee River. Perchlorate has also been detected in soils beneath storage pads and in surface water along Redstone's eastern boundary.

Maryland

Aberdeen Proving Grounds (APG)

The Aberdeen Area of the Aberdeen Proving Grounds (APG) is comprised of 17,000 acres. Since 1917 APG was used for the development and testing of chemical agent munitions. APG has large areas of land and water and numerous buildings that are contaminated or potentially contaminated with a variety of chemicals. Approximately 36,000 people live within three miles of the site. Tests of drinking water at APG have detected perchlorate in four production wells and in the finished water supply for the city of Aberdeen. Perchlorate levels detected ranged from 1.0 - 2.1 parts per billion (ppb) in production wells and from 0.2 - 1.0 ppb in supplied drinking water. Over the past two years, the average perchlorate in finished water has been about 0.6 ppb. Although the finished water perchlorate concentrations are at levels less than one ppb, monitoring well samples show a groundwater plume approximately 4,000 feet long and 1,000 feet wide ranging from 4 to 10 ppb with localized pockets of contamination of up to 50 ppb.

Despite several meetings between EPA Region 3 and Army staff, no agreement could be made on an EPA proposed interim remedial action that could reduce the amount of perchlorate moving toward the city of Aberdeen's production wells. Independently of EPA, MDE, and the Army, the city of Aberdeen is conducting pilot tests using an ion exchange resin, and may install a treatment system on the Aberdeen water supply.

Texas

Longhorn Army Ammunition Plant Karnak

The Longhorn Army Ammunition Plant (LHAAP) is an 8,493-acre facility that operated from 1942 to 1997. Site operations included: loading, assembling, and packing pyrotechnic and signal ammunition; manufacturing solid rocket motors; and demilitarization of rockets pursuant to a treaty with the former Soviet Union. Soils and groundwater at the site are contaminated with volatile organic compounds and rocket propulsion components including perchlorate. Surface water runoff from the site enters Caddo Lake, a public drinking water source for seven public water supply systems in the state of Louisiana. In February 2001, a perchlorate treatment unit was added to the site's groundwater treatment plant and has been successfully treating up to 50 gallons per minute of groundwater containing perchlorate up to 28,000 parts per billion (PPB) to levels less than 4 ppb. Numerous perchlorate field pilot studies have taken place and are ongoing at the site including an in-situ bioremediation of perchlorate and chlorinated solvents in groundwater study, a phytoremediation of perchlorate field demonstration, and an in-situ bioremediation of perchlorate-contaminated soils study.

Naval Weapons Industrial Reserve Plant (NWIRP) McGregor

This 9,700-acre Navy, Government Owned/Contractor Operated (GOCO) facility manufactured solid propellant rocket motors from 1978 to 1995. The city of McGregor is a willing recipient of this facility for the creation of an industrial park. Perchlorate is the main contaminant of concern in the surface water, groundwater, soils, and sediments. Other contaminants are volatile organic compounds, semivolatile organic compounds, metals, polychlorinated biphenyls, and explosives. Investigation and remediation began in 1998, and to date, 6,000 acres have been transferred to the city. Remediation systems consists of Bio-borings and Bio-Reactor Trenches which use such media such as gravel, mushroom

compost, and wood chips soaked in soy bean oil. Another system uses a groundwater recovery trench in conjunction with a Fluidized Bed Biological Reactor. With the Fluidized Bed Reactor processing between 35 and 300 gallons per minute (gpm), the average concentration of perchlorate prior to treatment is 2,310 parts per billion (ppb) with the treated water concentrations being below 4 ppb (Non Detect). To date, 117,000,000 gallons of water have been treated and approximately 2,500 pounds of perchlorate has been removed at an average rate of 1 pound per 47,000 gallons of water. There is offsite migration of perchlorate in groundwater, concentrations are declining due to dilution, it is persistent in sediments, and regular sampling confirms that no threat exists to two very large municipal raw water supplies.

III. EXTENT OF PERCHLORATE CONTAMINATION IN CALIFORNIA

The information on the reported perchlorate releases to the environment was an effort by a multi-region agency committee to bring together the available information on where this chemical has been detected in the environment. The investigations that are the source of the data represent often ground-breaking efforts. Regional Water Quality Control Boards, Department of Toxic Substances Control (DTSC), United States Environmental Protection Agency (USEPA), Department of Defense (DOD), and the Public Water Systems are the sources of the current information. Because the information was gathered for various purposes and with different and sometimes unspecified protocols, there has been no standardized approach to collecting or reporting perchlorate contamination.

Once the public water systems started to report perchlorate concentrations in the drinking water supply in 2000, the scope of the perchlorate problem became apparent. Drinking water wells have been taken off line and investigations regarding the sources of the contamination have begun by various environmental regulatory agencies. In addition, sampling at remedial sites located near or within areas impacted by perchlorate have beene sampled for possible soil and groundwater contamination where suspected.

The DOD has taken a number of actions to address perchlorate in drinking water by assessing the extent of perchlorate occurrence at active and closed installations, ranges, and Formerly Used Defense Sites (FUDS). DOD has established and is maintaining databases containing the information on Unregulated Contaminants Monitoring Rule (UCMR), National Pollutant Discharge Elimination System (NPDES) and site specific sampling.

The federal sites include active and closed installations, non-operational ranges, and formerly used Defense sites where funding has not already been allocated to address perchlorate. Any known perchlorate releases at a DOD site within one mile of a drinking water source where perchlorate has been detected warrant the highest priority for sampling. DOD has focused resources on the sites posing the most immediate threats to California's drinking water supplies. See Appendix A-5 for a list of DOD sites that have known perchlorate releases.

DOD and the state have jointly developed the California Prioritization Protocol that is intended to aid DoD and the State in prioritizing perchlorate investigations at DoD sites where sampling was unplanned and unbudgeted. A list has now been finalized of priority

DoD sites for perchlorate sampling. DoD and the state evaluated 84 DoD facilities and 227 Formerly Used Defense Sites (FUDS) under this protocol. The priority list of DoD sites includes 24 facilities and 14 FUDS. See Appendix B-2.

DOD activities that have possibly contributed to the release of perchlorate to the environment include the operations of open burn/open detonation areas for destruction of munitions and the use of propellants and pyrotechnics. Propellants are the chemicals that shoot munitions forward. They include composite propellants, which typically consist of aluminum and ammonium perchlorate, used in solid-fuel rockets of all sizes. Propellants are often found in firing areas as well as impact areas. Perchlorate has been found at Army ranges such as Camp Edwards.

Flares and signals are used as illuminators to support troop activity. Tracers, incendiaries, photoflash compositions, igniters and initiators, and munition simulators are also classified as pyrotechnic munitions. Compounds of concern used in pyrotechnic munitions include perchlorates used as oxidizers.

DOD military bases have destroyed stockpiles of excess and unserviceable munitions through burning and detonation, the armed services have also destroyed smaller quantities of weapons at less developed and less monitored OB/OD sites located on ranges. Those have historically generated kick-out, unexploded ordnance which is thrust from burn pits when other munitions explode. They typically generate higher concentrations of waste metals and explosive compounds than those found in impact areas, just because of the concentration of detonations.

USEPA Region IX has been working on various Superfund sites. Site investigations have been recently expanded to include the sampling of perchlorate in both groundwater and soil. Perchlorate has since been detected at various following Superfund sites including DOD facilities, Department of Energy (DOE) facilities, aerospace industrial sites, landfills, the San Fernando Valley water basin and the San Gabriel Valley water basin.

DTSC has been working on various sites under both RCRA corrective action and CERCLA remediation. Perchlorate has been detected at various sites including RCRA hazardous waste facilities, DOD facilities, and DOE facilities. See Appendix A-3 for the list of DTSC sites under investigation for perchlorate releases.

Perchlorate in soil posed another set of difficulties in reporting a site as having a confirmed release. Without a standardized sampling and analytical protocol, quantification of soil concentrations could be misleading. The solubility of perchlorate salts is so great that perchlorate-containing material found uncontained on the soil surface might reasonably be assumed to be contributing perchlorate to the subsurface through inevitable dissolution. There are a number of sites where the association between soil contamination and groundwater contamination is strongly established. The distribution of a solid perchlorate-bearing material on the soil surface may not be uniform. In at least one instance, identifiable pieces of a perchlorate-bearing propellant were gathered from the soil surface and this location is reported as a confirmed release.

Although many of the data originated from site-specific investigations, this document does not presume to definitively identify the facility responsible for the release nor the type of

operation associated with the release. Some of the facilities are fairly isolated and have clear histories of perchlorate handling. Others facilities mentioned are reasonable possibilities based on current information. There are a few sites with completely unidentified sources - occasionally with several potential contributors or with no known users of the chemical.

Although widespread monitoring efforts occurred in California, it is important to realize that the lack of perchlorate releases in a particular locality may merely reflect the absence of an effort to search for this contaminant. A high proportion of the locations on the current list of reported perchlorate releases were specifically targeted for perchlorate testing. At a number of sites, State or federal cleanup activities were ongoing before perchlorate was identified as an environmental issue.

Food Supply

The US Food and Drug Administration posted an initial set of perchlorate data that were collected. The data includes perchlorate levels found in lettuce, bottled water, and milk samples collected as part of an exploratory survey issued in December of 2003.

Perchlorate levels in milk ranged from 3.2 to 11.3 ppb in 101 out of 104 samples. These values are similar to those measured by the California Department of Food and Agriculture. Perchlorate levels ranging from 1.5 ppb to 10.6 ppb were measured in California milk.

Lettuce samples were collected at the grower or packing shed. The outermost leaves of each lettuce head were removed, similar to the actions typically taken by a consumer prior to consumption. Among 128 lettuce samples tested, perchlorate levels ranging from levels below the limit of detection to 129 ppb, with a mean of about 10 ppb in iceberg lettuce; green leaf lettuce; red leaf lettuce; and romaine lettuce. The source of the lettuce contamination is believed to be the Colorado River.

Results of 51 bottled water samples show non-detectable levels of perchlorate in 49 of the 51 samples. Two spring water samples were found to have 0.45 ppb and 0.56 ppb of perchlorate.

III. KNOWN CONTAMINATED SITES LISTED ON CALIFORNIA'S GEOTRACKER

There are 35 sites that have confirmed perchlorate contamination and are posted on the State Water Resources Control Board Geotracker database. See Appendix A-2 for the listing of California sites with known perchlorate contamination. This database is a joint effort by DTSC and the Regional Water Quality Control Boards. The source of the contamination is included in the database as:

14 aerospace (some of these overlap with ordnance);
13 ordnance (some of these overlap with aerospace);
9 other;
2 explosives not solely for military use; and
1 flare manufacturer.

Most of the sources of site contamination, 27 out of the 35, are defense related industries or military bases. Three former hazardous waste facilities are also included, two landfills and

one treatment facility. One of the most frequently found co-contaminants are volatile organic compounds, principally tetrachloroethylene (PCE) and trichloroethene (TCE). Generally if site remediation activities started prior to 1997, then the detection of volatile organic compound or other compounds were the trigger for remedial investigation.

There are a few sites that are listed for which there is little or no information available. The sole reason the sites are listed is because these sites are identified on Geotracker as having known perchlorate contamination.

Aerojet Electrosystems

Aerojet Electrosystems
1100 West Hollyvale Street
Azusa, California 91702
Los Angeles County

Site Description and History:
Aerojet occupied 800 acres in Azusa, Calif., about 40 miles east of downtown Los Angeles when it started manufacturing in the 1940s. In the past, the some of the site was vacant and used for cattle grazing until 1954. From 1954 to 1965, the facility operated as a small explosive research and development facility. During the 1970s, Aerojet Ordnance developed and tested mostly explosives, propellants and a few proprietary organic chemicals. Since 1974, the Facility has been involved primarily in the research, development, and testing of high explosive incendiary (HEIs) projectiles, armor piercing incendiary (APIs) projectiles composed of depleted uranium (DU), target practice projectiles (TPs) and fuses. The facility closed permanently in December 1995. There is contaminated groundwater, surface and subsurface soil at this 125 acre site. Contaminants include several chemical explosives, perchlorate, and unexploded ordnance.

The facility is located within the San Gabriel Valley Superfund Site (Baldwin Park Operable Unit). RWQCB is responsible for investigating sources of releases to soils and ground water and for remediation of soils. The remediation of ground water will be the responsibility of the USEPA under Superfund. There are numerous potential release sites at the facility. Groundwater found at approximately 300 feet below ground surface at the Aerojet facility is contaminated with a variety of volatile organic compounds (VOCs) and other facility derived chemicals, including perchlorate. Soil characterization samples were found at 5 feet below ground surface had concentrations up to 3,000 ppb. The approved remedial action plan includes soil removal of perchlorate and VOCs.

Aerojet Rancho Cordova

Aerojet (Rancho Cordova)
Highway 50 & Aerojet Road
Rancho Cordova, California
Sacramento County

Site Description and History:
The Aerojet General Corporation site covers 5,900 acres near Rancho Cordova, 15 miles east of Sacramento. The northeastern edge of the site is about 1/2 mile from the American River. Since 1953, Aerojet and its subsidiaries have manufactured liquid and solid propellant rocket engines for military and commercial applications and have formulated a number of chemicals, including rocket propellant agents, agricultural, pharmaceutical, and other industrial chemicals. Some wastes were disposed of in surface impoundments, landfills, deep injection wells, leachate fields, and some were disposed of by open burning. Underlying the site are extensive 40 to 100 foot-deep dredge tailings, a remnant of past gold mining operations.

In 1979, volatile organic compounds (VOCs) were found off-site. In the early 1990s, detection of part-per-million (ppm) levels of perchlorate in a drinking water supply aquifer led EPA's Superfund team to request the country's first evaluation of perchlorate's toxicity. Perchlorate was found in drinking water wells off-site above the provisional reference dose range (18 ppb) in January 1997. Groundwater is used extensively to supply municipal, domestic, industrial and some irrigation water. Public and private drinking water supply wells contaminated above action levels have been closed. Aerojet continues to monitor drinking water supplies to assure compliance with drinking water standards. The ground water plume extends four miles offsite and the perchlorate concentrations range from 360 ppb to less than 4 ppb.

The first large-scale perchlorate treatment process in the U.S. was developed and implemented at the Aerojet site in 1998. This biological system treats more than seven million gallons of contaminated groundwater each day and reduces blended perchlorate concentrations from 2,500 ppb to less than 4 ppb. EPA set an enforceable site-specific cleanup standard for perchlorate at 4 ppb.

USEPA required Aerojet-General Corp. to design, build, and operate a groundwater extraction and treatment system to contain and clean up groundwater contamination in the western portion of the Aerojet site. The groundwater treatment system will remove perchlorate using biological treatment process, ion exchange, bioreactor, and UV/OX with hydrogen peroxide.

Aerojet South El Monte

Aerojet
9100 Flair
South El Monte, California
Los Angeles County

There is an ongoing soil and groundwater investigation. See Section 10, San Gabriel Basin for additional information.

Aerojet General Chino Hills

Aerojet Ordnance
End of Woodview Road
Chino Hills, California
San Bernardino County

Site Description and History:
Aerojet occupies approximately 800 acres and operated under interim status for testing explosives. Of the 800 acres, 400 acres are leased. In the past, the site was vacant and used for cattle grazing until 1954. From 1954 to 1965, the facility operated as a small explosive research and development for Aerojet's Azusa plant. Since the 1970s, Aerojet was involved in research, development, and testing of ordnance. The facility closed permanently in December 1995.

The two areas with groundwater contamination include possible sources from the former Redwater Pond (chemical explosives in groundwater) and the Upper Test Area with perchlorate-contaminated groundwater. For the perchlorate-only area, the investigation will begin during the final remedy. For groundwater to surface water interactions, there have been detections of perchlorate and explosives, possibly from the former Redwater Pond.

Alpha Explosives

Alpha Explosives (Alpha Dyno Nobel)
3400 Nader Road
Lincoln, California
Placer County

Site Description and History:
Alpha Explosives owns the 23-acre property at 3400 Nader Road, Lincoln. Prior to 1964 and up until 1971, the land was owned by Chamberlain Ranch. Between 1971 and 1999, the land was owned by Wilson Ranch, when it was sold to Alpha Explosives. Between 1964 and 1971, Hercules Incorporated occupied the site. Hercules Incorporated conducted research and development of pourable slurries containing perchlorate, and manufactured and distributed ANFO which is a mixture of ammonium nitrate and diesel fuel. During this time, Alpha Explosives leased a small portion of the property from Hercules and distributed prepackaged explosives. Thereafter, Alpha Explosives has manufactured and distributed ANFO.

Site Contamination: There are groundwater monitoring wells at the site which have been sampled for five years. Constituents of concern and the maximum concentrations of perchlorate detected in groundwater at the facility is 110,000 µg/L in 1999. In soil, the maximum concentration of perchlorate was 1.6 mg/kg in 1999. The extent of soil pollution is adequately defined.

Remedy Selection: Alpha Explosives has preformed a biological treatability study for the perchlorate contaminated groundwater and a pilot test. The in situ bioremediation pilot test

consisted of treating a portion of soil beneath the former evaporation pond and treating the underlying groundwater. The former evaporation pond is within the suspected source area. Groundwater at this location contains about 30,000 µg/L perchlorate. The water quality objectives for the perchlorate have been set to 4 µg/l.

Beale AFB

US Air Force Base Beale
Beale AFB, California 95903
Yuba County

Site Description and History:
Beale Air Force Base (AFB) is an operating military base covering approximately 23,000 acres. Built in 1942, the base is comprised of runways, airfield operational areas, industrial area, housing, and recreational facilities.

Site Contamination:
Contamination is due mainly to land disposal and the standard waste management activities at the time. Thirty-two contaminated areas have been identified at Beale AFB, including landfills, fuel storage area, and a fire fighting training area. There are multiple groundwater releases and plumes at this facility. DTSC issued a permit requiring corrective action, but has not entered into a formal cleanup agreement with the facility. However, the Air Force is voluntarily carrying out investigations and remedial activities. Depth to groundwater varies across the site between 10 and 80 feet below ground surface (b.g.s). Contaminants of concern include volatile organics.

As part of the base wide groundwater monitoring program, the Air Force collected and analyzed groundwater samples from groundwater monitoring wells down gradient of the Explosive Ordnance Disposal area for perchlorate in 2001. Perchlorate was detected in concentrations ranging from 4 to 492 ppb.

Boeing Santa Susana Lab

Boeing Santa Susana Field Laboratory (SSL)
Wolsey Canyon Road
Simi Hills, California
Ventura County

Site Description and History:
The SSFL is located approximately 29 miles northwest of downtown Los Angeles, California, in the southeast corner of Ventura County. The SSFL occupies approximately 2,850 acres of hilly terrain with approximately 700 feet of topographic relief near the crest of the Simi Hills. The SSFL has been active since 1948 and is divided into four administrative areas (Areas I, II, III, and IV), with undeveloped land along the northern and southern boundaries.

The primary site activities at the SSFL since 1948 have included research, development, and testing of liquid-propelled rocket engines and associated components. Liquid-propellant rocket engine testing activities have been conducted at six major rocket engine test areas: Bowl, Canyon, Alfa, Bravo, Coca, and Delta. These areas were in operation simultaneously in the late 1950s and early 1960s. The Bowl, Canyon, and Delta test areas were phased out of operation in the late 1960s and 1970s. The Coca test area was shut down in May 1988. The Alfa and Bravo test areas are currently in operation. Engine testing at these areas primarily used petroleum-based compounds as the 'fuel' and liquid oxygen (LOX) as the 'oxidizer.' Solvents were used for cleaning of engine components.

In addition to the primary facility operation for testing liquid-propelled rocket engines, the SSFL was used for research, development, and testing of defense related technologies. Solid propellants, including perchlorate compounds, were primarily used, stored, or tested only at two locations within the SSFL: Building 359 and the Happy Valley sites. In total, these two sites cover only about 12 acres of the total 2,850 acres of the SSFL.

DTSC required subsurface investigations which identified a perchlorate plume beneath Boeing's Santa Susana Field Laboratory (SSFL) near Simi Valley. This site is located just west of the Los Angeles County/Ventura County borderline and 2 miles east of the Ahmanson Ranch well that recently detected perchlorate (one sample, not repeated). At the SSFL, the highest perchlorate concentration of 1,600 µg/L was detected along the eastern part of the facility in the fractured Chatsworth Formation.

Casmalia

Casmalia Resources
Ntu Road at the end
Casmalia, California
Santa Barbara

Site Description and History:
The Casmalia Resources Superfund Site is a 252-acre inactive commercial hazardous waste treatment, storage, and disposal facility located in Santa Barbara County, California, 1.2 miles from north of the Town of Casmalia, and four miles from the Pacific Ocean. Between 1973 and 1989, the site accepted approximately 5.6 billion pounds of waste which included sludges, pesticides, solvents, acids, metals, caustics, cyanide, and non-liquid polychlorinated biphenyls (PCBs). The facility included landfills, ponds, shallow wells, disposal trenches, and treatment units. More than 10,000 companies and government entities sent waste to Casmalia during this period.

The site's owners and operators stopped taking shipments of waste material in 1989 and abandoned efforts to properly close and clean up the site in 1991. From 1992 to 1996, EPA used Superfund authorities to take emergency actions to stabilize the site. These actions included installing and operating systems for collecting, treating, and disposing of contaminated subsurface liquids, controlling the flow of storm water, and stabilizing the landfills.

Actions taken at the site include capping landfills, installation and operation of a ground water treatment system, and managing numerous surface impoundments. Numerous additional improvements have been made to the site to stabilize slopes, reduce infiltrating rainwater's contact with wastes, improve contaminated liquids control, and improve access to site areas. The Remedial Investigation Work Plan was approved in June, 2004. Based on the Remedial Investigation and Feasibility Study, final remedies will be selected. These may include capping an additional landfill, closing some of the surface impoundments, capping additional waste disposal areas, and the installation of a final ground water treatment system.

China Lake Naval Weapon

China Lake Naval Weapons Station
China Lake, California 93555-6100
Kern County

Site Description and History:
US Navy China Lake is a Naval Air Weapons Station (NAWS). In 1943, the NAWS began to develop, test and evaluate weapons systems. The facility is approximately 1.1 million acres and is not currently on the NPL.

Site Contaminants:
Contaminants of concern in groundwater are solvents and jet fuel. There are several feet of free floating petroleum. The extraction of free product has been sporadic over the years. However, a more permanent free product extraction system is currently being evaluated. There is also a soil vapor extraction system that began operation in April 2000 and which is located at the former public works gas station. The petroleum releases are not fully characterized.

There are several other smaller solvent plumes at the site which still have not been characterized. The facility are in the process of formalizing some institutional controls which would limit exposure to soils contaminated with lead, mercury, jet fuel, unexploded ordnance, depleted uranium, and asbestos at various locations at the site. There multiple landfills on-site containing both municipal and hazardous waste.

Denova Rialto Colton

Denova Environmental, Inc.
2610 North Alder Avenue
Rialto, California 92377
San Bernardino County

Denova has operated at different locations in Rialto. The address at 2610 North Alder is the site where both Broco and Denova operated a hazardous waste facility. The location at 2824 North Locust Avenue was used to manufacture and store explosive devices, and was co-located with an office and a laboratory.

Permitting Status and History
The Department authorized Broco, Inc. to manage hazardous waste at the Site by interim status document (ISD) issued on September 18, 1981. Broco Environmental, Inc. purchased the Site from Broco, Inc. in 1992. Broco was authorized to store, transfer, and/or consolidate a variety of hazardous wastes, including waste explosives, reactives, flammables, oxidizers, and corrosives. Broco was also authorized to operate two Open Burn/Open Detonation (OB/OD) Units for the disposal of explosive hazardous wastes.

In 1987, Broco Inc. moved its operation from the original location at 2610 North Alder (Pre-1988 Broco TSDF Location) to a location approximately ½ mile to the north (Denova TSDF Location), when an explosion in a neighboring ammunition bunker destroyed a number of the structures at the Pre-1988 Broco TSDF Location. Broco continued to use the original 2610 N. Alder Avenue address although the new location is not contiguous with the original location. Operations at the OB/OD unit ceased in 1994.

In April 1999, Denova purchased Broco Environmental, Inc. On May 15, 2000, the Department approved transfer of interim status authorization from Broco Environmental, Inc. to Denova. DTSC terminated Denova's Interim Status Authorization in 2002.

California Regional Water Quality Control Board Santa Ana Region issued Investigation Orders to Denova Environmental, Inc. in October 2002 pursuant to Section 13267 of the Water Code. Denova was considered a potential perchlorate dischargers in the Rialto, Colton, and Chino Groundwater Subbasins. Perchlorate was detected in soil sapmples at a concentration level as high as 460 ppb.

Edwards AFB

NASA Jet Propulsion Laboratory
Dryden Flight Test Facility
Air Force Research Laboratory
Edwards AFB, California 93524
Kern County

Description:
Edwards Air Force Base (AFB) is a 301,000 acre military base located in the Antelope Valley region in Southern California about 60 miles northeast of Los Angeles. Edwards Air Force Base is an Air Force Command Test Center. The primary function of Edwards is to test new and existing air-craft and integrate them into the present Air Force inventory. The land area occupied by the base is 470 square miles. Within this land area there are 3 separate Air Force Bases, complete with runways and infrastructure; the NASA Dryden Flight Test and Space Shuttle Recovery facilities; the 50+ square mile Phillips Laboratory rocket test facility; the Precision Impact Range Area; and the Rogers and Rosamond Dry Lake Beds. In the past, the base was the home of the U.S. Army Helicopter Flight Test Center and the NASA Jet Propulsion Laboratory. During World War II, the base trained P-38 fighter pilots and B-24 bomber crews. After World War II, the base became a flight test center.

Perchlorate contamination at Edwards AFB resulted from years of solid-fuel propellant development and rocket testing. This solid propellant testing created several groundwater plumes on Edwards AFB in Operable Units (OUs) 4, 5, 6, 9, and 10. The maximum concentration of perchlorate detected at Edwards AFB was 160,000 parts per billion (ppb) in OU 5. A Remedial Investigation into the extent and type of contamination is currently underway. This site is being addressed in six stages: immediate actions and five long-term remedial phases focusing on cleanup of the entire base.

Perchlorate contamination at Edwards AFB resulted from years of solid-fuel propellant development and rocket testing. This solid propellant testing created several groundwater plumes on Edwards AFB. The maximum concentration of perchlorate detected at Edwards AFB was 160,000 parts per billion (ppb). An ion exchange treatability study has been implemented at Site 285. This treatability study was initiated in May 2003 and is expected to run for two years with the hope that this study will not only demonstrate the technology's effectiveness, but also achieve cleanup to levels safe to human health and the environment. Since May 2003, 2.6 million gallons of groundwater have been treated and 7 pounds of perchlorate have been removed.

Another treatability study at Site 293 has also been initiated through the installation of a groundwater extraction and ion exchange treatment system to treat the perchlorate detected in groundwater.

Embee Metal Plating

Embee Incorporated
2136 South Hathaway Street
Santa Ana, California 92705
Orange County

Established in 1948, Embee has serviced aerospace and commercial customers for over 50 years. The California facility includes 124,000 square feet of production space, spread over 11 buildings. Over 65 metal-finishing and non-destructive test processes provided. No additional information is available at this time.

G.E. Plastics

LNP Energy
Energy and Environmental Research
1831 East Carnegie Avenue
Santa Ana, California 92705
Orange County

No additional information is available at this time.

Hwy 12 & Explosive Technology Road

Universal Propulsion Company/OEA Aerospace
Former Explosive Technology, Inc.
3530 Branscombe Road (was Explosive Tech Road & Hwy 12)
Fairfield, California
Solano County

Site Description and History:
The facility is located at 3530 Branscombe Road (formerly Explosive Technology Road) in Fairfield, Solano County. The site, was formerly known as OEA Aerospace, is located on 550 acres in the Potrero Hills, 2.5 miles south of Travis Air Force Base, and 3.5 miles southeast of the city of Fairfield. This facility has 177,000 square feet of facility space. Universal Propulsion Company Inc. (Goodrich Corporation) now operates the facility, which includes approximately 506 acres leased from OEA Aerospace, Inc., and 25 acres located at the Launch Site, leased from the United States Department of the Air Force.

The facility was built in 1956 by the U.S. Army and was operated as a NIKE missile battery from 1956 until it was decommissioned in 1964. The primary activities during this period included the operation, maintenance, and fueling of NIKE missiles. In 1967, Explosive Technology, which was subsequently renamed OEA Aerospace, Inc., purchased the majority of the old NIKE facility and property and leased a 25-acre parcel from the U.S. Department of Defense. Beginning in 1967 and continuing to the present, explosive tests were routinely conducted for research, development, and quality assurance testing of explosive devices.

During the late 1980s, the U.S. Army Corps of Engineers conducted an environmental assessment of this Formerly Used Defense Sites (FUDS) and determined that the former military activities on the 338 acres did not mandate any additional cleanup action. For the 25-acre DOD Annex, the regulatory status is being deferred until the RWQCB can rescind its order and the U.S. Air Force can renegotiate with U.S. EPA Regional IX.

Remedial Activities:
A risk-based approach was used for conducting an investigation and to evaluate risks associated with potential exposure of human and ecological receptors to contaminants at the site. The analytical results for soil indicated elevated concentrations of lead and the concentrations generally decreased with depth. Soil samples were also analyzed for explosives and concentrations were detected up to 920 mg/kg and were localized near the centers of lead-impacted areas. Higher concentrations of explosives seem to be located near the soil surface.

Groundwater beneath the site contains perchlorate in concentrations of up to 350 ug/L and chlorinated solvents. Further characterization is required to confirm boundaries and stability of the plumes. The volatile organic compounds appear to be related to current or historic product coating processes, and extend laterally several hundred feet down gradient.

Remediation Activities:
Further characterization of groundwater is needed to evaluate the need for groundwater remediation. At this time, it appears a combination of long-term monitoring and institutional constraints are the most viable remedial alternative for impacts to groundwater. Other remedies that may be considered include monitored natural attenuation, enhanced bioremediation, and source removal.

In groundwater, perchlorate and volatile organics have been identified in concentrations exceeding the California MCL or DHS action level and pose toxicity risks. Immediate cleanup is not necessary because shallow groundwater is not currently used for drinking water. Future use of shallow groundwater for drinking or irrigation is not likely because shallow groundwater is perched and not expected to sustain usable flow rates.

Lawrence Livermore National Lab

Lawrence Livermore National Laboratory (Site 300) (USDOE)
Coal Hollow Road, California
Alameda County and San Joaquin County

Site Description and History:
The 11-acre Lawrence Livermore National Laboratory (Site 300) has been operated by the University of California for the U.S. Department of Energy (DOE) primarily as a high-explosives and materials testing site in support of nuclear weapons research since the 1950s. Approximately 350 people who work in the area are provided with drinking water from groundwater in the area. Most are laboratory employees and State of California employees who work in a nearby State vehicular recreation area. Adjacent ranch houses and a State fire station also draw drinking water from the aquifer.

Groundwater and soil have been contaminated with volatile organic compounds, tritium, uranium-238, high explosive compounds, nitrate, and perchlorate. The primary health threat is drinking contaminated groundwater. In 1991 and 1992, DOE installed two groundwater extraction and treatment system to curtail the migration of the volatile organic compounds

contamination plume. Soon after, DOE began capping two landfills to prevent rainwater runoff from causing contaminant migration.

DOE scientists developed an innovative constructed wetlands system to biologically degrade nitrate under relatively low-flow conditions (5 to 10 gallons per minute) at remote locations throughout the site. Both nitrate and perchlorate are degraded to harmless elements by related microbial populations that are supported by the wetlands, which are contained in tanks that can be relocated as necessary. There are currently two treatment facilities with wetlands, used in conjunction with ion exchange, and one more facility is planned. The contained wetlands have reduced perchlorate concentrations from 10 to 20 micrograms/L to less than 4 micrograms/L. Nitrate concentrations have been reduced from 90+ mg/L to below 45 mg/L (the discharge requirement).

Lockheed Beaumont

Lockheed Propulsion Corporation #1
17255 S Highland Spring Road
Beaumont, California

Lockheed Propulsion Corporation #2
Jack Rabbit Trail
Beaumont, California
San Bernardino County

Site History and Description:
Historically, the predominant activity at this site was ranching. In the 1950's, the Grand Central Rocket Company purchased the land and began a remote testing facility for space and defense programs. The Lockheed Propulsion Company purchased the property in 1960, and began operations at the testing facility in 1963. The Beaumont facility is comprised of 2 sites. Site #1 consists of approximately 9,100 acres and is the area where the majority of the testing activities were conducted. Site #2, consisting of 2,500 acres, is located approximately 5 miles from Site #1. The 2 sites were used for the processing, testing, and disposal of solid rocket propellant, among other products, in the 1960's, and early 1970's. Operations at the facility ceased in 1974.

Between 1974 and 1986, portions of the overall site were used for sheep ranching and training of heavy equipment operators. These practices were ceased when the potential for contamination was discovered. Hazardous substances that were stored and/or released on-site during Lockheed's operation include: solvents, purgeable organics, and beryllium. An initial sampling program in 1986, confirmed the presence of solvents used to clean and remove grease from metals in the upper groundwater aquifer. This relatively small reservoir of groundwater is thought to be separated from the deeper aquifer by a layer of rock, so it is unlikely that the chemicals have entered the deeper aquifer.

A limited remedial investigation was conducted. In September 1989, samples were collected from the burn pits, landfill, and area of the onetime burial of low-level radioactive waste.

Laboratory analysis of the sample from the burial area found very low, nonhazardous levels of 2 radioactive materials which did not exceed background levels.

Principal areas of concern at Site #1 are a series of pits where various wastes were burned and a permitted sanitary landfill. Principal areas of concern at Site No. 2 include the propellant burn area, garbage disposal site, the final assembly building, test bay, and other miscellaneous facilities. In 2002, Perchlorate was identified as potential chemical of concern in groundwater. Appropriate treatment technologies are being identified to remediate.

Lockheed Propulsion Corp Redlands

Lockheed Propulsion Corporation
1500 Crafton Ave
Redlands, California
San Bernardino County

Site Description and History:
The site operated from 1958 to 1961 as Grand Central Rocket, and as 7-W Enterprises from1978 to the present.

Lockheed produced mixtures of solid fuel at this site. Perchlorate material was mixed in 300-gallon batches to produce propellant. Lockheed also manufactured a sulfide type propellant. Residual waste was burned onsite. The operation of the onsite leach fields were prohibited in 1965 by the air pollution control district and were then drained. The City of Redlands shut down wells west of the site due to volatile organic compound contamination.

MCAS El Toro Marine Corp

U.S. El Toro Marine Corp Air Station
9 miles Northeast of Newport Beach, California 92709
Orange County

Site Description and History:
The Marine Corps Air Station (MCAS) El Toro was officially closed in 1999. The Air Station covered approximately 4,700 acres in central Orange County adjacent to the convergence of Interstate Freeways I-5 and I-405. Commissioned in 1943, it supported the Fleet Marine Forces in the Pacific Ocean, serving as the major west coast jet fighter facility. Approximately 1,100 acres of land are irrigated by wells located within three miles of the site.

Site Contamination:
A total of 25 potentially contaminated areas have been identified on the Air Station, including four landfills suspected of containing both hazardous and solid waste, and other areas where polychlorinated biphenyls, battery acids, leaded fuels, and other hazardous substances were suspected of being dumped or spilled. Current remedial investigations

have focused on three major activities that contributed to the contamination. Two large aircraft hangars are the primary source volatile organic compounds contamination detected in groundwater that has migrated more than three miles off base. A remedial investigation conducted shows the primary identified volatile organic compound in groundwater is trichloroethene.

The four landfills have been inactive from 18 years to more than 40 years. There are some low levels of contamination, primarily volatile organic compounds and metals, detected in groundwater adjacent to the landfills. However, the contaminant plumes appear to be stable and are not migrating. Although no drinking water sources have been contaminated, the Upper Newport Bay Ecological Reserve (located approximately eight miles from the base) is potentially threatened.

The Navy is currently conducting a remedial Investigation at the former Explosive Ordnance Disposal Range. The Range was in operation from 1952 to 1999 when the base ceased operations. Military Ordnance used at the Range included hand grenades, land mines, cluster bombs, rocket warheads as well as commercial explosives. Major concerns includes a groundwater plume of perchlorate discovered beneath the range.

McClellan AFB

McClellan Air Force Base
Approximately 5200 Watt Avenue, California 95652
Sacramento County

Site Description and History:
The 2,952-acre McClellan Air Force Base was established in 1936 and operated as an Air Force Logistics Command Base with a primary mission of management, maintenance, and repair of aircraft, electronics, and communication equipment. The operation and maintenance of aircraft have involved the use, storage, and disposal of hazardous materials including industrial solvents, caustic cleansers, paints, metal plating wastes, low-level radioactive wastes, and a variety of fuel oils and lubricants. McClellan AFB closed as an active military base in July 2001. The County of Sacramento and their development partner have leased building space to a variety of businesses and organizations that are now part of McClellan Business Park.

Site Contamination:
The Air Force has identified 325 waste areas and potential release locations divided into 10 operable units. Active cleanup of solvents in soil and groundwater has been continuing since first started in the mid 1980s. Other studies are now nearing completion and will support final cleanup decisions over the next 7 years. Remaining soil cleanup actions are anticipated to occur while the current and new businesses and development are established and property is transferred by deed over the next 10 to 15 years.

Groundwater, sludge, and soil have been contaminated with volatile organic compounds. Surface soils have been contaminated with PCBs, heavy metals, and a wide range of non-

volatile organic compounds. Perchlorate has been detected at low levels (15 ppb) in groundwater.

Remediation Activities:
The cleanup at the site is being in multiple stages: two interim actions, removal actions, and final actions. The Air Force organized their remedial investigation based on the 10 geographic areas of soil and surface contamination and 8 groundwater plumes. Early actions addressed some soil and landfill sites with removals and caps, while other early actions addressed groundwater plumes with a gradually expanding groundwater extraction and treatment system enhanced by numerous soil vapor extraction systems. A resin exchange unit has been added to the existing groundwater extraction treatment unit to treat the perchlorate.

McDonnell Douglas Inactive

Kinetech Corp
Former McDonnell Douglas – inactive test site
11505 Douglas Road
Rancho Cordova, California 95742

Site History and Description:
The site, comprised of approximately 4,000 acres, is located between White Rock Road and Douglas Boulevard and between Sunrise Boulevard and just west of Grant Line Road. The site was utilized from approximately 1956 to 1972 for the assembly and testing of rocket systems and components. Solid rocket motors and fuels, liquid propellant engines and components were developed and tested. Aerojet General Corporation utilized a joint burn area located in the northwest corner of the site and supervised testing of their Titan missile system at the site during McDonnell Douglas Corporation's ownership. Aerojet owned property from 1956-1961 and from 1965 to present, with McDonnell Douglas Corporation owning the property from 1961-1965. The last static rocket test occurred in 1969.

The site consisted of seven areas, six utilized as test areas and one area serving for engineering and administration. Several other areas have been identified at the site including landfills, propellant burn areas and a rice hull burn area. During the processes involved in cleaning tested materials and maintaining test areas, numerous solvents, including chlorinated solvents, were utilized. Fuels utilized in testing included RP-1, hydrazine, ammonium perchlorate, and liquid hydrogen/oxygen. Solvents used in the process were discharge to unlined drainage ditches. A down-gradient supply well was discovered to have been contaminated with chlorinated solvents in 1990.

Remedial Activities:
The Remedial Action Plan has been completed to cleanup perchlorate in groundwater that migrated to Mather Field in 2001. The chosen alternative is to control the plume hydraulically by extraction, treat the contamination with a fluidized bed bioreactor and dispose of the treated water into the American River. The design proposes to pipe the extracted water from several locations at Mather and to be transferred to the treatment system.

The remedial action plan includes excavating perchlorate contaminated soil, treat it with in-situ biodegradation stockpile methods, and backfill it into the on-site excavations after it is clean. Deeper contamination and groundwater contamination will be addressed separately at a later date.

A perchlorate groundwater extraction and treatment system was constructed and started operating at the north end of Mather Field in March 2003. The system utilizes ion exchange with a strong anionic resin. It will stop contaminant migration at the leading edge of the plume, and protect down gradient and public water supply wells in Rancho Cordova.

NASA/JET Propulsion Lab

National Aeronautics and Space Administration (NASA)/Jet Propulsion Laboratories (JPL)
4800 Oak Grove Dr.
Pasadena, California
Los Angeles County

Site Description and History:
NASA Jet Propulsion Laboratory (JPL) is a space science lab covering 176 acres in Pasadena. JPL was placed on the NPL in 1992 after several solvents were found in down gradient drinking water wells. This facility engages rocket research, testing and production where by solid rocket propellant fuel containing perchlorate is used. The area is primarily residential with some light commercial operations. The site is bordered by the San Gabriel Mountains on the north, an equestrian club and the local Fire Station on the south, a residential neighborhood on the west, and the Arroyo Seco Dry Wash on the east.

The Army developed and operated JPL between 1945 and 1957. In 1958, jurisdiction was transferred to the National Aeronautics and Space Administration (NASA). The California Institute of Technology conducts research and development at JPL under a NASA contract in the areas of aeronautics, space technology, and space transportation.

Site Contamination:
Sources of contamination at the site include seepage pits where liquid and solid wastes were reportedly disposed of, a settling chamber in the storm drain system, contaminated soil excavated from part of that system, and an area where waste solvents were dumped into three separate holes. Hazardous substances include waste solvents, solid rocket fuel propellants, cooling tower chemicals, sulfuric acid, freon, mercury, and chemical laboratory wastes.

In 1990, JPL detected significantly elevated levels of volatile organic compound contaminants in the groundwater underneath. The groundwater contamination from the JPL has traveled off site and has affected several drinking water wells. Perchlorate was first discovered at down gradient wells in 1996. Two wells owned by the City of Pasadena are still out of service because of perchlorate contamination.

Remediation Activities:
Subsequent on-site and off-site investigations have identified an on-site source area with levels of perchlorate in groundwater around 1,500 parts per billion (ppb). The off-site portion of the plume has levels up to 200 ppb, and the plume has caused seven water supply wells to be taken out of service.

NASA/JPL is proceeding with implementing an approved Remedial Action Plan (RAP) to remove perchlorate and volatile organic compounds from groundwater onsite and offsite. This is being done under Regional Board and USEPA regulatory oversight. In July 2004, NASA paid for the installation of an ion exchange and carbon treatment system at the Lincoln Avenue Water Company. The system is currently treating approximately three million gallons per day. An on-site treatment system is under construction. This system will use a fluidized bed biological reactor to treat approximately 125 gallons per minute which will be pumped from the source area. The treated water will then be injected back into the aquifer. Plans are currently underway to install an ion exchange system on wells owned by the City of Pasadena. The plume should be contained and treatment systems installed on affected city wells by mid-2005. A pilot study will be conducted to test the viability of using in-situ bioremediation to reduce the concentration of perchlorate in the on-site source area.

Nation Construction Rentals - Colton-Rialto

This site was once use by Denova as an office location. No additional information is available at this time.

National Semiconductor

National Semiconductor
Former United Technologies Corporation
1050 East Arques Avenue
Sunnyvale, California 94086
Santa Clara County

The former United Technologies Corporation (UTC) facility was located at 1050 East Arques Avenue. This 10-acre parcel was the eastern side of a 23 acre parcel of land utilized by UTC since 1963 for the purpose of research, development and small-scale testing of rocket propellants. Two buildings were present on the 10-acre parcel: the research laboratory building and the test building located on the southern section. During the period that UTC occupied the site, several outdoor areas were used for chemical drum storage and/or rocket propellant testing. In addition, three underground flow-through acid neutralization sumps were used. Hewlett-Packard bought the property from UTC between 1982 and 1983 and removed the UTC buildings.

The former UTC facility was located approximately 200 feet northwest of the National Semiconductor site at 2900 Semiconductor Drive, Santa Clara, California. Pollutants from the National Semiconductor property migrated to merge with a pollutant plume emanating from the former UTC site across the street and downgradient of National Semiconductor at

1050 East Arques Avenue. National Semiconductor has since assumed full responsibility to complete all necessary soil and groundwater remedial action programs related to the former UTC facility.

Olin Corp

Standard Fusee
Former Olin Corporation
425 Tennant and Railroad Avenues
Morgan Hill, California
Santa Clara County

Site Description and History:
Olin's property is a 13-acre parcel. Olin and its successor, Standard Fusee, operated a flare manufacturing facility there from 1955 to 1995. The plant had used potassium perchlorate, a flare ingredient, during the 40 years of operation. Perchlorate has contaminated groundwater underlying the site, spreading as far south as Leavesly Road in Gilroy, about 7.5 miles.

Prior to 1956, Agricultural use was the site activity. Then from 1956 to 1996, the site was used to produce and warehouse highway flares. The building and associated structures were demolished and removal of buildings in 1998 leaving 1,000 tons of waste skeet. Perchlorate had not yet identified by scientific community as a potential contaminant of groundwater.

Site Contamination:
Perchlorate was detected in groundwater samples in 2000. Three on-site monitoring wells were installed in the shallow zone and perchlorate was detected in all three wells. By late 2003, Regional Water Quality Control Board and the Santa Clara Valley Water District had confirmed a groundwater plume currently extending over nine miles through residential and agricultural communities. An extensive well testing program is underway for approximately 1,200 residential, municipal, and agricultural wells in the area.

Remedial Activities:
Large ion exchange treatment units are operating for three public water supply systems in which seven municipal wells are impacted, and bottled water is being supplied to nearly 800 households with private wells by the potentially responsible parties, Olin Corporation and Standard Fuse Incorporated. The Regional Water Quality Control board is overseeing PRP cleanup efforts.

Purity Delta Gunnite

Purity Oil Delta Gunnite
11100 White Rock Road (White Rock Road & Kilgore Road)
Rancho Cordova, California
Sacramento County

The site is the former location of a waste oil recycling facility. Currently, there are no structures on site. Perchlorate has been detected in groundwater monitoring wells.

San Bernardino County Potential Responsible Parties

Various drinking wells have been impacted by perchlorate contamination. A specific source has not been identified but multiple possible responsible parties have been issued investigation orders based on past operations to investigate soils for confirmation of perchlorate.
This site was originally the Rialto Ammunition Back-up Storage Point operated by the United States Army (U.S. Army). Various businesses have since occupied different parcels within the former Army installation. All of the following addresses are located within this Formerly Used Defense Site (FUDS):

U.S. Army Corp of Engineers
The Rialto Ammunition Back-up Storage Point was operated from 1942 to 1945. The U.S. Army acquired 2,811 acres in a remote unincorporated area of San Bernardino County. The original facility comprised 20 igloos and 40 bunkers for the storage of ordnance-loaded railcars during World War II. The site was sold and divided up. Various companies have all subsequently used portions of this property. Less than 1600 acres of the original site are the focus of perchlorate investigations. These acres are bordered by Casa Grande Drive to the north, Highland Avenue to the south, Sierra Avenue to the west and North Locust Avenue to the east. Although much of this area is not accessible by city streets, the addresses used by most of the business located here are located on Stonehurst Drive,

North Alder Avenue and North Locust Avenue. The following are past and present businesses that have been located here and their addresses.

3196 North Locust Avenue

Pyro Spectaculars	(current)
Celebrity Fireworks	(current)
American Promotional Events	(1989-current)
Red Devil	(1966-?)
Clipper Pyrotechnics Corporation	(1966-?)
Ordnance Associates	(1964-1966)
B.F. Goodrich	(1957-1964)
Emhart Industries	(1957-?)
West Coast Loading	(1950-1957)
Kwikset Corporation	(1950-1957)

This site is about 160 acres and includes two small streets, West Tudor Avenue and West Lowell Avenue. This address is bordered by North Locust Avenue and Casa Grande Drive. From 1950 to 1957, Kwikset Corporation operated West Coast Loading Company a manufacturer of pistols, photo-flash cartridges, and parachute flares. Emhart Industries was the successor company of West Coast Loading Company. In 1957, B.F. Goodrich used the site to perform solid propellant research and development for the U.S. Air Force until 1964. Ordnance Associates leased site for military storage for two years, 1964-1966.

Red Devil (Clipper Pyrotechnics Corporation) bought a 100 acres (75 to 80 buildings) of the site in 1966. Red Devil was an importer and distributor of fireworks which came from out-of-state, principally China and Taiwan.

Pyro Spectaculars which previously operated as Celebrity Fireworks, Inc. is the current property owner. Pyro Spectaculars are importers, exporters and wholesalers of fireworks. The site has storage buildings and 2 bunkers. In 1989, American Promotional Events leased a portion of the site for firework storage.

2298 West Stonehurst Drive

Astro Pyrotechnics
Trojan Fireworks, subsidiary of Pyro Spectaculars
Golden State Explosives
Whittaker Corporation

This Rialto site has been a manufacturer of theatrical fireworks and pyrotechnic articles since 1971. The five acres site includes three bunkers for storage. Whittaker Corporation was a former facility operator at this address. Perchlorate was detected in 12 soil samples at concentrations ranging from 1.2 mg/kg to 32 mg/kg to a depth of about ten feet.

2170 West Stonehurst Drive (Bunkers)

Denova/Broco , Inc.
Zambelli Fireworks
Aerojet (Gencorp)
This site has six storage bunkers for storage only on a five acres site. The bunkers are principally for propellant storage. No additional information is available at this time.

2390 North Alder Avenue
Mid-Valley Sanitary Landfill

The northeastern area of the property consists of about 120 acres was purchased in 1994. This property contained 19 storage bunkers that were built during World War II by the federal government. After the war, the property was subdivided and sold. The bunkers appear to have been used by various parties for the storage of fireworks. The county demolished the bunkers in 1998.

Soil and groundwater sampling was performed as part of a remedial investigation during 2002/2003. Perchlorate was detected in only a few soil samples at levels above the method detection limit of 0.03 ppm, but below .4 ppm (the practical quantitation limit). Perchlorate ranging from 1.3 ppb to 340 ppb was detected in groundwater samples obtained from three of the five deep bores.

2440 North Alder Avenue
Celebrity Fireworks
No additional information is available at this time.

2610 North Alder Avenue
General Dynamics
See Denova (Broco, Inc.)

North Alder Avenue
The Marquardt Company
No additional information is available at this time.

2824 North Locust Avenue
Aerojet Propulsion Energetic
Raytheon Company
General Dynamics
Denova (was Broco, Inc.)
No additional information is available at this time.

2250 West Lowell Avenue
Pyro Spectaculars
No additional information is available at this time.

2900 North Tamino
ETI Explosives Technologies Inc.
American West Explosives, Inc
No additional information is available at this time.

Sierra Army Depot

Sierra Army Depot
County Route A26
Herlong, California 96113
Lassen County

Site Description and History:
US Army Sierra Depot is an ordnance storage and testing facility. Construction of the facility began in 1942, although portions of the land were used for aerial combat training in 1931-32. Sierra's current missions are to provide logistical support for operational stocks and war reserves and the demilitarization of conventional munitions. The base has undergone Base Realignment and Closure but is not closing. The RCRA permit for the ongoing open burning/open detonation operations has caused significant concern amongst members of the public.

Site Contamination:
Soils contamination at the site consists of metals (primarily lead), pesticides and ordnance. Areas of known contamination are controlled either through remedial actions which have been implemented or access restrictions in areas which are controlled due to their use as weapons storage facilities. There are four groundwater plumes at the site. The groundwater contaminants include trinitrotoluolene, trichloroethylene, perchlorate, and petroleum.

Remedial Activities:
Monitored Natural Attenuation with source removal are remedial plans for the groundwater. Some of the remedies are still being evaluated for TCE and petroleum contamination. An active groundwater extraction system in place to contain one of the TCE groundwater plumes. Groundwater monitoring will determine the effectiveness of this remedial system to assure the plume is under control.

Special Devices Inc.

Special Devices Inc. (Newhall)
16830 W Placerita Canyon Road
Newhall, California 91321
Los Angeles County

Special Devices, Inc. (SDI) designs and manufactures highly reliable pyrotechnic devices. SDI is a maker of initiators (pyrotechnic devices) used primarily in automotive airbag systems. The airbag initiators activate inflators that enable the airbag to be deployed. The company also makes micro gas generators that remove seatbelt slack in the event of a collision. The Company's other products are used the aerospace industry, primarily in tactical missile systems, spacecraft launch vehicles, propellants, explosives and military aircraft crew ejection systems. Production of the company's products consists of fabricating and assembling the hardware components and separately preparing the pyrotechnic charge. The customers for the company's products are the US Government and others.

Stringfellow Site

Stringfellow Site
3490 Pyrite Street
1 mile north of Glen Avon, California
Riverside County

Site Description and History:
From 1956 until 1972, the 17-acre site was operated as a hazardous waste disposal facility. Over 34 million gallons of industrial waste, primarily from metal finishing, electroplating, and pesticide production were deposited in evaporation ponds. Spray evaporation procedures were used to decrease the volume of waste in the ponds. In 1969, excessive rainfall caused the disposal ponds to overflow and resulted in the contamination of Pyrite Creek and Channel. In 1978, heavy rains caused the RWQCB to authorize a controlled release of 800,000 gallons of wastewater from the site to prevent further pond overflow and massive releases. An additional 500,000 gallons of liquid waste were moved at that time to a federally approve facility. Between the years 1975 and 1980, approximately 6.3 million gallons of liquid wastes and materials contaminated with pesticides were removed from the site. A contaminated groundwater plume potentially affected private drinking water wells. Since 1989, the community no longer relies on groundwater.

Perchlorate remediation remedies implemented include a groundwater barrier system, and Source control of groundwater

TDY Industries

TDY Industries
Former McCormick Selph Ordnance
Former Teledyne Ryan Aeronautical
3601 Union Road,
Hollister, California
San Benito County

Site History
McCormick Selph, Inc., designs, develops, qualifies, and manufactures state-of-the-art controlled pyrotechnics (electric igniters, electric primers, explosive bolts, gas generators, etc.) for the aerospace and automotive industries. In May 1971, McCormick Selph completed the Hollister facility and started manufacturing operations at the 270-acre site. In 1993, McCormick Selph, which was then a subsidiary of Teledyne, Inc., was realigned with Ryan Aeronautical and became Teledyne Ryan Aeronautical/McCormick Selph Ordnance. Allegheny Teledyne Incorporated was formed in August 1996 through the business combination of Teledyne, Inc. and Allegheny Ludlum Corporation.

In late 1999, Allegheny Teledyne sold the business and assets of McCormick Selph but retained certain liabilities related to the business, including liability for certain environmental issues at the Hollister facility. Subsequently, as part of a spin-off of two new entities, Allegheny Teledyne changed its name to Allegheny Technologies and Teledyne Industries

changed its name to TDY Industries. Consequently, TDY Industries is considered the responsible party for environmental issues at the facility.

Site Contamination
Prior to the sale of McCormick Selph, the prospective buyer sampled all existing onsite monitoring wells for various potential contaminants. In June 1999, Teledyne informed Regional Board staff that perchlorate and volatile organic compounds had been detected in some monitoring wells.

Over the past ten years, total annual perchlorate use at the facility has averaged approximately 1,800 grams of potassium perchlorate and 300 grams of ammonium perchlorate with the following exceptions: (1) During a two-year period from 1998 through 2000, approximately 500 lbs (226,750 grams) of potassium perchlorate were used annually at the facility and (2) current projected use for 2003 includes approximately 5 lbs (2,260 grams) of ammonium perchlorate. Perchlorate wastes are thermally destructed at the facility.

TDY Industries has conducted a series of soil and groundwater investigations to determine the source areas and extent of perchlorate and volatile organic compounds contamination at the site. Results of groundwater monitoring show that in wells where perchlorate was detected the concentrations range from 19 to 5,500 µg/L. Perchlorate was not detected in water supply wells and the perchlorate plume appears to be contained on the site.

Remediation
To clean up the perchlorate plume within the alluvial deposits in the vicinity of the Thermal Destruct Facility, enhanced in-situ bioremediation is being proposed because of the relatively elevated levels of perchlorate within this plume and the presence of downgradient water supply wells. This process has been used with success at the Whittaker facility. Three additional monitoring wells were installed to monitor perchlorate concentrations along the margins of the perchlorate plume

U.S. Naval Air Station

U.S. Naval Air Station
San Nicolas Island
Ventura County

San Nicolas Island, approximately nine miles long and four miles wide, lies in the Santa Barbara Channel 75 miles west of Los Angeles. San Nicolas Island is the most northwesterly of the four southern Channel Islands. The entire 13,370 acres of San Nicolas Island is a US Navy owned and operated. San Nicolas Island Navy Outlying Field includes a 10,000 ft runway, and 2 hangers located near the southwest edge of a 500 ft mesa. Other support facilities include an air terminal, housing, a power plant, a fuel farm and other necessary base support functions. The west end of San Nicolas Island is often used for missile operations.

Following the war, San Nicolas Island was an ideal location for placement of radar and telemetry equipment to observe missile testing in Pt. Mugu's 100-mile long range. San Nicolas was officially disestablished as an NAAS on December 15, 1946, becoming an Auxiliary Landing Field of Pt. Mugu. The island also has several target sites used in missile testing. Perchlorate has also been detected in two supply wells at the United States Naval facility on San Nicolas Island. Perchlorate contained in explosive ordinances is believed to be the source.

United Technologies Corporation

United Technologies - Chemical Systems Division/Pratt & Whitney Space Propulsion
600 Metcalf Road
San Jose, California 95138
Santa Clara County

Site Description and History:
United Technologies Corporation (UTC) lies southeast of San Jose in the foothills of Santa Clara County. UTC owns and occupies a large (5,113 acre) property where it has operated a solid rocket motor research and development facility since 1959. Ammonium perchlorate is still used extensively as the oxidizing agent in solid rocket fuel. About 3,000 acres of the property are developed and used for various research and industrial processes.

The Santa Clara Formation underlies the facility. Three seasonal creeks (Shingle Creek, Mixer Creek, and Las Animas Creek) flow through the most heavily developed portions of the facility, and a fourth (San Felipe Creek) passes along the easternmost portion of the property. These streams merge near the southeastern boundary of the site, and the combined flow (Las Animas Creek) flows southeastward into Anderson Reservoir. Anderson Reservoir is the largest drinking water reservoir in Santa Clara County, and is less than one-half mile from the UTC property.

In several places, particularly during times of high precipitation and recharge, groundwater containing perchlorate discharges to the creeks, producing a measurable impact on surface water quality. To date, chemicals released at the UTC facility have not been detected in Anderson Reservoir.

Site Contamination:
This RCRA facility is contaminated with fuels including diesel, various volatile organic compounds (VOCs), including trichloroethylene, and perchlorate both in ground water and soil. Ground water contaminated with perchlorate is used for lawn irrigation. Site investigations initiated in the 1980s revealed that large amounts of organic solvents and other chemicals used and stored on site had been released to the environment and had impacted soil and groundwater beneath the site. The extent of contamination has generally been established, and contamination is largely contained within the property boundaries.

UTC has performed extensive soil and groundwater remediation at the site. These remedial efforts generally have been focused on maintaining hydraulic control and preventing off-site migration of solvent plumes through groundwater extraction. While a significant amount of

chemical mass has been removed and site conditions have improved through remediation, solvent concentrations in several portions of the site remain highly elevated above cleanup goals.

Although the presence of perchlorate as a contaminant of concern is relatively recent, its presence in soil and groundwater at the site has long been known. The extent of perchlorate contamination is still being defined although it is known to exist in soils, groundwater and surface water. Investigations to establish the extent of perchlorate contamination at the facility were initiated in 1998. Several perchlorate source areas and groundwater plumes have been identified, and some areas have very high concentrations. Off-site migration of perchlorate in groundwater plumes has been limited by extensive groundwater extraction at the down-gradient UTC property boundary.

Perchlorate has been detected at on-site creek sampling locations during the wet winter months, but because of dilution, perchlorate has rarely detected at off-site locations and perchlorate has never been detected in Anderson Reservoir.

Remedial Activities:
UTC has performed extensive soil and groundwater remediation at the site. These remedial efforts generally have been focused on maintaining hydraulic control and preventing off-site migration of solvent plumes through groundwater extraction. While a significant amount of chemical mass has been removed and site conditions have improved through remediation, solvent concentrations in several portions of the site remain highly elevated above cleanup goals. Groundwater extraction must be continued to maintain plume control and prevent solvent migration.

There is a ground water pump and treat system and a soil vapor extraction (SVE) system with numerous extraction wells. Remediation systems are designed for removal of volatile organic compounds but not for perchlorate. Impoundments and settling units have been closed and capped. Soil was removed in the Debris area and from the Open Burn/Open Detonation units. The facility has hundreds of monitoring wells.

Groundwater:
Several plumes of contaminated groundwater with elevated levels of various solvents and other contaminants shown above are present in alluvial stream valleys. The plumes extend southeastward towards Anderson Reservoir. There is an extensive groundwater pump and treatment system in place for volatile organic compound control. A barrier wall was constructed in the Lower Shingle Valley Creek area. Ground water is located from the surface to approximately 60 feet in depth.

Soils (surface and subsurface):
Soils on site were contaminated with various solvents, fuels and perchlorate. The main releases over much of the facility result primarily from solid rocket manufacturing activity. Soil remediation will also be required for perchlorate.

UTC recently completed a risk assessment for perchlorate and 1,4-dioxane, and proposed risk-based soil and groundwater cleanup levels for these chemicals. Region Water Quality Control Board has approved the risk assessment. On the basis of the risk assessment, UTC proposed a cleanup standard of 6 micrograms per liter (ug/L) for perchlorate in

groundwater. Groundwater extraction, followed by experimental phytoremediation, and ion exchange resin treatment are being proposed for the treatment of perchlorate.

Vandenberg AFB

USAF Vandenberg AFB
98,400 acres; 55 Miles NW of Santa Barbara
Vandenberg AFB, California 93437
Santa Barbara County

Site Description and History:
Vandenberg Air Force Base has functioned as a missile test base and aerospace center since 1958 and is currently operated by the Air Force 30th Space Wing. Approximately 136 different sites have been identified as potential release sites to address past hazardous materials disposal sites, control hazardous contaminants migration, and evaluate remedial alternatives. The major types of potential release sites at the installation include chemical and domestic waste landfills, abandoned missile silos, space launch complex and underground fuel tanks. Chlorinated hydrocarbons have been detected in the groundwater near several sites. Other contaminants at the Base include: pesticides, polychlorinated biphenyls (PCBs), heavy metals, and hydrazine.

Whittaker Bermite

Santa Clarita LLC - Rail Station - Site A
Former Whittaker Bermite
22116 Soledad Canyon Road
Saugus, California 91350
Los Angeles County

Site Description and History:
The original site was 976 acres. The Halifax Powder Company opened the facility in 1906 which was purchased by the Bermite Corp in 1930s. Whittaker Corp purchased the property from Bermite in 1967. The facility was closed in 1987. The buildings have been demolished and the facility is currently not operated. The explosives manufacturing plant at the Bermite Facility operated between 1906 and 1987.

The site contained approximately 350 buildings located through out the site which were used for manufacturing, storage and testing of explosives and administrative purposes. From 1934 until 1987, explosives were manufactured and tested, and off specification items were burned and buried on the site. Potassium perchlorate and ammonium perchlorate were also used as the oxidizer component of propellant mixtures. The facility was operating under interim status under RCRA and operating fourteen hazardous waste treatment, storage and disposal units. At the time of closure, 14 regulated hazardous waste management units had operated at the site.

In 1992, Whittaker Corporation submitted to DTSC an environmental assessment for a 10.3 acre parcel of the site. In 1993, a soil investigation in the Burn Valley area of the site detected contamination. This ten acre portion of the northern border portion of the site has been since been converted into a commuter rail station by the city of Santa Clarita.

The Whittaker Corporation completed the sale of 23 acres of its Bermite facility to Santa Clarita L.L.C. (SCLLC) in 1999. SCLLC is conducting site investigations and required remediation at the site in order to develop the site for residential and commercial use. SCLLC's contractors are conducting site-wide ordnance and explosive waste clearance work as a part of the restoration process.

Whittaker Ordnance

Life Sparc, Incorporated
Former Whittaker Ordnance
Former Quantic Incorporated
2751 San Juan Road
Hollister, California
San Benito County

Site Summary
Whittaker Ordnance manufactured explosives from 1980-1993. In 1993, Quantic Incorporated purchased the property and continued to manufacture explosives. Whittaker continues to be responsible for cleanup of the property.

The local land usage is mainly agricultural. The facility has supplied nearby properties with either 1) municipal water connections or 2) well-head treatment. There is still domestic and agriculture use of ground water in this immediate area. Ground water does not discharge to surface water. Closest surface water is the San Benito River that is approximately a half mile north of the facility. This surface water is not being contaminated by this facility.

Contamination
Maximum concentration of perchlorate found in groundwater is 250,000 ppb. Releases came from septic leach systems that accepted sewage and hazardous waste. Contaminants have migrated offsite. The facility has installed offsite monitoring wells. Ground water is found in perched zones and at depths beginning at 16 feet.

An interim measure was conducted in 1993 by installing carbon adsorption treatment systems for the removal of volatile organics at each point of domestic water use served by wells. The carbon adsorption treatment systems installed at residences served by the Riverside well were removed in November 1996 following connection to municipal water. Another interim measure, consisting of the conversion of two monitoring wells into extraction wells, was completed in 1994.